

PLYWOOD IN MODERN AUSTRALIAN ARCHITECTURAL DESIGN



INTRODUCTION

Plywood was first invented in 1865, although did not start to see more widespread production until the early 1900s. Expanding from door panels to the automobile industry, the adoption of plywood by the architecture and design industries only occurred properly following the commercial standardisation of its manufacturing processes and interior and exterior grade qualities in 1938.¹

With almost 80 years having passed since then, the role of plywood in architecture has expanded significantly beyond its utilitarian applications or a role of behind-the-scenes practicality. Its various qualities, from structural strength to visual appearance – among others – are now being recognised and plywood is capable of being specified in any number of applications.



PLYWOOD'S USES TODAY

In contemporary architecture, plywood is seeing increasing uptake for practical and aesthetic purposes. Plywood is the most common material used for concrete formwork, and was already often used for behind-the-scenes utilitarian purposes such as for structural bracing. However, its role has since expanded into more decorative purposes given its versatility, natural beauty, strength and environmental friendliness, ranging from floors, walls and ceilings, to cabinetry and furniture.

Of course, its newfound decorative applications are not for solely aesthetic purposes, with plywood also available as acoustic panels that can reduce the reverberant noise within a space. Furthermore, its exceptional strength to weight ratio, surface dimensional stability, impact resistance and panel shear mean that it is suitable for applications such as shear walls and webbed beams.²

As a renewable resource with low costs, easy installation, flexibility, a strong appearance and strong structural capabilities, plywood is proving itself as a material with endless possibilities.³

UNDERSTANDING PLYWOOD AND ITS VARIATIONS

The manufacturing of plywood is undertaken in Australia with strict standards in place, set by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ), who are responsible for Australian and New Zealand Regional Standards, in conjunction with Standards Australia, the Engineered Wood Products Association of Australasia (EWPPAA), and other industry stakeholders.⁴ Despite this, plywood can have significant variations from product to product due to the different options available in the manufacturing process and depending on its final intended use.

These variations include:

Dimensionality: Plywood comes in a series of standard dimensions, although several lengths, widths and thicknesses are available. These dimensions are determined primarily on intended use (such as flooring, structural bracing or concrete formwork), although also vary from supplier to supplier.⁵

The thickness of plywood will depend both on the thickness of each individual ply as well as the number of plies. More plies are typically demonstrative of a more stable product with increased warp and shear resistance when compared to a plywood sheet of the same thickness with fewer plies, although this still depends on the quality of both the timber and glue line specified.

Glue line: As defined by AS 2754.1, there are four types of glue lines available for specification. These are labelled types A through to D, and are determined by their durability and weatherability.⁶ Types A and B are suitable for exterior use, while C and D are both classified as interior bonds, not suitable for structural applications or wherever wet or damp conditions

are expected. Type A bond is recommended by the EWPPAA wherever there are "areas of doubtful moisture conditions, such as areas around sinks, vanity units and laundry tubs."⁷

Grading: Similar to glue lines, the grade of plywood is denoted through a lettering system, with specific grades able to be specified for each face of the plywood sheet depending on its final intended purpose. Grades A, S and B are each appearance grade veneers, with A being clear of defects, S being permitting of natural characteristics, and B being suitable for high quality paint finishing (but not clear finishes). Grades C, D and PG are all non-appearance grade veneers, with increasingly prominent defects such as knots, splits or rough grain.

However, lower grade veneers are still valuable for use in applications where only a single side will be visible, as well as for other purposes such as concrete formwork (Grade C), structural bracing (Grade D) or general packaging purposes (Grade PG).⁸ Certain timbers, such as Hoop and Birch are typically preferred decorative purposes due to a higher consistency of colour, grain and veneer quality.

CONSIDERATIONS WHEN SPECIFYING PLYWOOD

The primary characteristics to consider when specifying plywood are in regards to the aforementioned variables, being its dimensions, glue line and grading. Those three characteristics combined will comprise much of the performance expectations one would have for plywood sheeting. This includes its appearance, such as its grain structure, colour and presence of defects, as well as its target life expectancy, which is defined partially by regulation and partially by any contractual requirements. The target life expectancy of temporary hoarding, for instance, would be considerably different to that of a structural element in a commercial building.

The level of reliability is another important consideration, with safety, cost and consequence of failure each factoring in. Like any material, costs associated with plywood will range from initial purchase and installation to ongoing maintenance and potentially repair or replacement. Investing in a higher quality product at a higher initial price point will likely reduce further costs later on.

Designing for fire resistance is another crucial consideration when specifying plywood, which in many instances does not have any inherent fire retardant properties. Regardless, the requirements outlined by the BCA will differ based on the building class, whether or not the project is located in a bushfire area, and what the intended use is for the product. Certain species of timber will have greater fire resistance than others, and can be impregnated with fire retardant under high pressure in order to achieve a higher than otherwise possible rating. In order to comply with the BCA requirements outlined in Section C, one can either comply with the performance criteria or with the "Deemed to Satisfy" provisions that offer alternative solutions.⁹



PROJECT: McDonald's Family Restaurant | LOCATION: South Perth, Western Australia | ARCHITECTS: Hindley & Associates | INTERIOR DESIGN: Work Shop Dine | CABINET MAKER: Diverse Shopfitters | PRODUCT: DesignerPly, perforated acoustic wall panelling and furniture.



PROJECT: Private Residence | LOCATION: Westernport, Victoria | DESIGN: ARM Architecture | PRODUCT: DesignerPly Hoop, wall, ceiling and flooring panelling | PHOTOGRAPHY: John Gollings Photography.

Other potential issues that come with plywood include colour variation, resistance to general wear and weather damage, delamination and sustainable sourcing. Being a natural product, colour variations will undoubtedly occur between plywood sheets based on age, species, individual trees, sun exposure or other reasons entirely. This can be minimised by ordering through a single supplier, and larger suppliers are more likely to have larger selection of similar stock on hand.

Depending on the area of specification, different plywood sheets could be expected to handle significantly varying degrees of general wear and tear. Plywood in high traffic areas is best off with a scratch resistant or powder coating in order to dramatically increase service life. Powder coated plywood is easier to clean and maintain, and may also create a new dimension to the space through colour. Similarly, weather damage can be expected over time for any exterior-located plywood. However, it is important to be informed about the product being specified. Marine grade plywood, for instance, is high-grade plywood that tends to be “lightweight, strong and virtually free of defects”, popular for use on ship hulls and similar – but it is not waterproof or rot-resistant.¹⁰

Rather, it is glued together using waterproof glue and so will not delaminate or lose structural capabilities, and depends on a high quality water resistant finish if it is to be exposed to moisture. Delamination is more of a risk when using lower-grade gluelines, although they are still suitable for interior specification where water exposure is not a risk.

Regardless of the grade of plywood specified, correct installation is still necessary in order to prevent issues further down the line, particularly in regards to waterproofing. Plywood cladding products are typically installed using shiplap joints or at least with a 2-3mm gap, allowing for some panel movement due to moisture changes.¹¹ Given the standard sizes that plywood is manufactured in, studs are expected to be at either 600mm or 400mm centres.¹² Like any timber product, sustainable sourcing, through schemes such as the Forest Stewardship Council (FSC) or Australian Forestry Scheme (AFS), which is endorsed by the Programme for Endorsement of Forest Certification (PEFC), is incredibly important to ensure wood is being harvested from legal,

sustainable forests. Illegal harvesting damages the environment and natural habitats, as well as local communities who will often depend on the forest for their economic and social livelihoods.

DESIGNERPLY BY GUNNERSEN

Established in 1879, the Australian owned, family-run company Gunnensen has been long committed to product and technological innovation. Recognising the potential of timber, Gunnensen is the largest independently owned distributor of wood-based panel products, timber and decorative surface materials across both Australia and New Zealand. Gunnensen has been involved in the production and distribution of plywood since 1930.¹³

Gunnensen holds Chain of Custody certification under both FSC and AFS across their range of timber products, including their latest range, DesignerPly. DesignerPly is a high quality range of decorative plywood chosen specifically for its visual impact. However, by ensuring Chain of Custody, Gunnensen can ensure that their timber is being sourced from legal and sustainable resources, and can provide consumers peace of mind that their attractive decision is not detrimental to the environment.

Available in a range of dimensions and with a variety of finishes, DesignerPly is capable of forming wall panelling, joinery and ceiling panels (including acoustic panels), and Gunnensen have demonstrated that they are leading the way in expanding the potential of plywood as an architectural product.

The DesignerPly range is made using Grade A or permanent Phenolic gluelines, ensuring it does not delaminate in the toughest of service environments. With Grade A or premium grade faces and ranging between Grade A, or premium grade, and Grade C, or solid non-appearance grade backs, Gunnensen have also prioritised the highest quality appearance across the range. The options available mean that architects and specifiers can achieve the desired effect while still meeting deadlines and budgets, with Gunnensen’s extensive network capable of both servicing any project across Australia and New Zealand and providing valuable experienced-based assistance wherever required.

